DOCUMENTS EXPEDITING PROJECT

86th Congress
1st Session } JOINT COMMITTEE PRINT

EMPLOYEE RADIATION HAZARDS AND WORKMEN'S COMPENSATION

SUMMARY-ANALYSIS OF HEARINGS

MARCH 10, 11, 12, 17, 18, AND 19, 1959

JOINT COMMITTEE ON ATOMIC ENERGY

CONGRESS OF THE UNITED STATES

SEPTEMBER 1959

Printed for the use of the Joint Committee on Atomic Energy

UNITED STATES
GOVERNMENT PRINTING OFFICE
45792 WASHINGTON : 1959

JOINT COMMITTEE ON ATOMIC ENERGY

CLINTON P. ANDERSON, New Mexico, *Chairman*
CARL T. DURHAM, North Carolina, *Vice Chairman*

RICHARD B. RUSSELL, Georgia	CHET HOLIFIELD, California
JOHN O. PASTORE, Rhode Island	MELVIN PRICE, Illinois
ALBERT GORE, Tennessee	WAYNE N. ASPINALL, Colorado
HENRY M. JACKSON, Washington	ALBERT THOMAS, Texas
BOURKE B. HICKENLOOPER, Iowa	JAMES E. VAN ZANDT, Pennsylvania
HENRY DWORSHAK, Idaho	CRAIG HOSMER, California
GEORGE D. AIKEN, Vermont	WILLIAM H. BATES, Massachusetts
WALLACE F. BENNETT, Utah	JACK WESTLAND, Washington

JAMES T. RAMEY, *Executive Director*

SUBCOMMITTEE ON RESEARCH AND DEVELOPMENT

MELVIN PRICE, Illinois, *Chairman*

CARL T. DURHAM, North Carolina	JOHN O. PASTORE, Rhode Island
JAMES E. VAN ZANDT, Pennsylvania	ALBERT GORE, Tennessee
CRAIG HOSMER, California	BOURKE B. HICKENLOOPER, Iowa

G. EDWIN BROWN, Jr., *Professional Staff Member*
ALFRED C. BLACKMAN, *Committee Consultant*

CONTENTS

	Page
I. Introduction	1
A. General	1
B. Background	1
C. Purpose and scope	2
II. Summary	2
A. Areas of agreement	3
B. Areas of disagreement	4
C. Possible courses of action	4
III. Detailed discussion	5
A. Nature and control of hazards	6
1. Radiation hazards and relationship to injury	6
2. Standards of radiation protection	7
3. Control of radiation hazards	9
B. Compensation for radiation injuries	13
1. Existing laws and needs	13
2. Proposed changes in laws	14
Appendix A.—Outline of public hearings, March 10–19, 1959	17
Appendix B.—Extent of protection under State workmen's compensation laws for workers exposed to radiation hazards	20

CONTENTS

Page

I. Introduction 1
A. General 1
B. Background 1
C. Purpose and scope 2
II. Summary 3
A. Areas of agreement 4
B. Areas of disagreement 4
C. Possible courses of action 5
III. Detailed discussion 6
A. Nature and control of hazards 6
1. Radiation hazards and relationship to injury 7
2. Standards of radiation protection 9
3. Control of radiation hazards 12
B. Compensation for radiation injuries 13
1. Existing laws and needs 14
2. Proposed change in laws 17
Appendix A.—Outline of public hearings, March 10–19, 1959 19
Appendix B.—Extent of protection under State workmen's compensation laws for workers exposed to radiation hazards 20

EMPLOYEE RADIATION HAZARDS AND WORKMEN'S COMPENSATION

I. Introduction

A. General

The Research and Development Subcommittee of the Joint Committee on Atomic Energy held public hearings March 10–12 and 17–19, 1959, on the subject of employee radiation hazards and workmen's compensation. During the course of these hearings some 40 expert witnesses appeared before the subcommittee to present their views.

The hearings were a continuation of the Joint Committee's inquiry into atomic radiation hazards begun in 1956. They are part of several related series of hearings during the current 1959 session of Congress which have been devoted to the nature and control of radiation hazards in atomic industry. The first of this group of hearings on the subject of industrial radioactive waste disposal was held in February by the Special Subcommittee on Radiation. The second set of hearings on employee radiation hazards and workmen's compensation followed in March. The third set of hearings was held in the latter part of May on the subject of Federal-State relationships.

In line with the procedure used in several previous hearings where the subject matter is quite technical in nature—such as waste disposal and fallout—the subcommittee invited expert witnesses to present testimony on individual aspects of the problem within their particular field of competence.[1] An attempt was made to obtain a variety of opinions so as to insure a thorough discussion of the major questions and issues involved. The subcommittee is grateful, in this regard, for the help it received from an informal advisory panel of experts which made suggestions on the subject matter to be covered and on expert witnesses to testify at the hearings.[2]

B. Background of Hearings

The subcommittee had intended to hold hearings on employee radiation hazards and workmen's compensation during the last session of Congress but the press of committee business, together with a recognition on the part of participants that more time would be desirable for preparation, resulted in a postponement of the hearings until the present session of Congress.

[1] For a list of the witnesses and the subject matters they covered, see app. A p. 17.

[2] The advisory panel was made up of the following members: Ernest C. Anderson, U.S. Public Health Service; John Chapman, AEC; Jack Curran, AFL-CIO; J. Dewey Dorsett, Association of Casualty & Surety Companies; Bruce Greene, Department of Labor; Arthur W. Motley, Department of Labor; Dr. William Pierce, University of Michigan Law School (invited but could not attend); Herzel H. Plaine, AEC; Lester R. Rogers, AEC; Charles F. Schwan, Jr., Council of State Governments; Richard A. Schwarz, Department of Labor; Oscar Smith, AEC; Ferrest Western, AEC; Hubert Yeunt, Liberty Mutual Life Insurance Co.; and Dr. Mitchell R. Zavon, Kettering Laboratory.

The interim period was useful in providing time for the participants to get their thoughts together and to come to grips with the many complex issues and problems which were involved. During this period, at the subcommittee's request, the Atomic Energy Commission in cooperation with the Labor Department prepared a report to the committee covering in some detail major aspects of the problem. This report, together with selected materials on the subject matter to be discussed, was incorporated in a committee print which was made available for informational purposes prior to the hearings

C. PURPOSE AND SCOPE OF HEARINGS

In announcing the hearings, the chairman of the subcommittee, Representative Price, made the following statement:

> In recent years we have witnessed a widespread growth of peacetime atomic activities, not only in the Government's laboratories but in private industry as well. The vast increase in the use of radioisotopes by Government and industry is but one example of this dramatic development.
>
> With the growth of these activities, particularly in the industrial and private medical sphere, has come the increasing problem of maintaining the necessary controls over the use of radioactive materials so as to insure the health and safety of workers in atomic plants. Aside from physical safety of workers, there is the complex problem of compensation when a worker receives a radiation injury and the question of causal relationship between the two.
>
> During the course of the hearings we intend to cover, in orderly sequence, the general background of industrial radiation hazards and where atomic industrial hazards fit into this picture; the type of safety measures which are being adopted to guard against these hazards, including education and training program; and examples of experience at individual atomic installations, both Government and private.
>
> The hearings will also cover Federal, State, and private activities which are being undertaken to prevent radiation accidents to employees; the application of workmen's compensation laws to radiation injuries, including some of the main problem areas and inadequacies in existing laws; and a discussion of proposed changes in existing laws, both State and Federal, to take care of these inadequacies.
>
> I am hopeful that these hearings will serve the double purpose of providing a forum for discussion of the many complex problems involved in this important aspect of peacetime atomic development and of compiling pertinent information for the guidance of State and Federal Governments. Such action is necessary, in my opinion, if we are to avoid a hodgepodge of conflicting laws and regulations governing the peacetime uses of atomic energy.

We believe that these hopes expressed by the subcommittee chairman have been fully justified and that the hearings served a useful purpose in deliniating the problems more clearly and in providing a framework for future action.

II. Summary

One of the most interesting aspects of the hearings was that there were so many broad areas of agreement on general needs and objectives among witnesses with widely varied approaches to the subject. The main differences of opinion occurred with regard to what measures should be taken to realize these needs and objectives.

Following is a summary of these areas of agreement and disagreement, together with a brief description of possible courses of action to be taken to meet present and future needs.

A. AREAS OF AGREEMENT

A review of the testimony indicates that there is practically universal agreement on the following points:

1. There is need for coordinated guidance on adequate standards for maximum permissible exposure to radiation, and these standards should be uniform throughout the United States in order to avoid conflict and misunderstanding.

2. More information is needed with regard to the effects of ionizing radiation on man, and greater research is required to determine at what point exposures are noninjurious, if at all.

3. There is need for more persons to be trained in radiation control techniques. Such persons are needed by government agencies, insurance carriers, and by industry, with a view to doing a better job of keeping occupational exposures to a minimum level.

4. There is need for adequate enforcement of radiation standards when they are adopted in codes or regulations. (No witness attempted to define what was adequate.)

5. There is need for centralized records of individual exposures in order to know the amount of radiation which an individual has absorbed and also to prevent him from exposing himself unnecessarily to excessive radiation.

6. There is need for a greater public knowledge of radiation, its hazards, and its methods of control, among workers, the general public, communities, and so on.

7. There is a need to assist communities in planning for accidents in the handling of radioactive materials in the normal operation of business so that local government officials will be aware of the proper protective measures to take, both for themselves and for the members of the public that they are obligated to protect.

8. Compensation laws should include at least these provisions: (*a*) Radiation diseases should be classified as occupational diseases and should be compensated for by all compensation systems; (*b*) the time limit for filing claims should take cognizance of the fact that the disability from radiation exposure might not occur until long after the original exposure; (*c*) any diseases caused by radiation should have complete medical treatment during the course of disability and, following this, treatment should be continued for whatever period of time is medically necessary to rehabilitate the injured person completely; (*d*) compensation benefits, as contained in the law, should be paid on the basis of loss of earnings or the loss of earning capacity; (*e*) standards by which the causal relationship between exposure and subsequent disability can be established (i.e., a mechanism by which there would be a presumption of causal relationship or guidelines incorporated into the law to accomplish this result).

It was also agreed that there is a need for strengthening various regulations which apply to this type of activity, whether it be through the Federal level or at the State level, and that such regulations should be enforcible as a part of the workmen's compensation system.

B. AREAS OF DISAGREEMENT

Although there were, as noted above, many areas of general agreement on needs and objectives, there were substantial differences of opinion on how these needs and objectives could best be met. There were some witnesses who felt that Federal legislation and control is necessary to insure uniformity of treatment and that the States could not and probably would not enact appropriate legislation quickly enough to handle the problems that are either now in existence or will be shortly. Advocates of this point of view also emphasized the necessity for a Federal compensation law administered by the Federal Government.

On the other hand, some witnesses had the equally strong conviction that the States would act if given the opportunity and that the most that the Federal Government should do would be to assist the States by outlining the significant problems for them and urging them to amend their respective laws to take account of these problems. There were also differences of opinion as to whether the AEC should extend its regulatory control to mining operations and whether the regulation of isotope users should be removed from the jurisdiction of the AEC together with the licensing of reactor installations.

In general, it could be said that most of the differences of opinion among witnesses occurred more on the method of carrying out the desired objectives rather than on the objectives or ends themselves.

C. POSSIBLE COURSES OF ACTION

In reviewing the testimony and the materials submitted by the witnesses and others in connection with the hearings there appear to be a number of possible courses of action that the Federal Government could take to accomplish the objectives which, in general, the witnesses agreed were most desirable. Without attempting to evaluate them, these possible courses of action are listed below:

1. Send the transcript of the hearings and this summary-analysis to all of the States, preferably to the compensation boards and commissions and to the top administrative officers, with the suggestion that they review the material as a source of information for action in connection with their compensation laws and regulations.

2. Adopt a congressional resolution for transmission to all of the States, together with copies of the committee hearings and analysis, calling attention to the problems brought out at the congressional hearings and emphasizing the importance of State governments taking action to meet these problem areas.

3. Amend the Walsh-Healey Public Contracts Act to require that any firm receiving a contract from the Federal Government be located in a State whose compensation laws meet certain minimum standards with respect to the compensation of employees who receive radiation injuries.

4. Provide a special tax on all licensees in States whose compensation laws do not meet certain minimum standards set up pursuant to Federal law. This tax would be utilized to provide compensation benefits for radiation injuries to employees within the State.

5. Refuse to issue licenses for the use of isotopes or special nuclear material in those States whose compensation laws do not meet the desired standard.

6. Representatives of the Federal Government could personally visit the various States, particularly those whose compensation laws are inadequate, and review with responsible administrative officials in the State the kinds of changes that are needed in order to bring the laws of the particular State into line with a predetermined standard.

7. Provide grants-in-aid by the Federal Government to those States whose compensation laws meet the desired standards. Such grants-in-aid would be used to provide training for State employees so that they could adequately enforce regulations and codes designed to prevent excessive occupational exposures to workers.

8. Establish a Federal system of compensation benefits and radiation protection regulations for injuries resulting only from ionizing radiation throughout the United States.

9. Establish a complete and uniform system of workmen's compensation and safety standards at the Federal level for all types of injuries and diseases arising out of all types of occupations. There was no explanation as to how this might be accomplished.

10. Establish a Federal Board to make recommendations on radiation standards and their application. Membership of the Board would comprise representative of responsible Government agencies including AEC, the Department of Health, Education, and Welfare, the Commerce Department, and the Labor Department. In addition to coordinating activities at the Federal level, the Board would also provide guidance to the various State governments with regard to standards.[3]

III. Detailed Discussion

Following is a detailed discussion of the major points discussed in the hearings. These include (1) the nature of radiation hazards, their effects on man, and the causal relationship between exposure and subsequent injury or disability; (2) standards of radiation protection, their history, development and basic concepts; and (3) methods used in various types of installations to control radiation hazards.

The discussion also covers compensation for radiation injuries, including existing laws and gaps which need to be filled; proposed changes in present laws to meet these requirements; and the need for further study of the problem.

[3] An Executive order was issued by the President on Aug. 14, 1959, (a) Creating a Federal Radiation Council to advise him on standards and other matters, (b) directing the Department of Health, Education, and Welfare to intensify its efforts in radiological health and to assume primary responsibility for collection and analysis of data on environmental radiation levels, and (c) directing the AEC to assume primary responsibility for preparing the States to assume certain regulatory duties.

On Sept. 1, 1959, the Joint Committee on Atomic Energy approved legislation (S. 2568, S. Rept. No. 870; H.R. 8755, H. Rept. No. 1125) providing a statutory basis for the Federal Radiation Council and increasing the membership of the Council from 4 to 5. The President's Executive order named the Secretary of Health, Education, and Welfare, the Chairman of the Atomic Energy Commission, the Secretary of Defense, and the Secretary of Commerce as members of the Council. The above legislation added the Secretary of Labor to the Council membership, and required the Council to consult with qualified scientists and experts in radiation matters, including the President of the National Academy of Sciences and the Chairman of the National Committee on Radiation Protection. The legislation was passed by the Senate and the House on Sept. 11, 1959, and is awaiting the President's signature.

A. NATURE AND CONTROL OF HAZARDS

1. Radiation hazards and relationship to injury [4]

It was pointed out in the testimony that the nature of ionizing radiation is different than most other types of hazards, in that it cannot be detected by any human senses. Many people are concerned about the hazard of something which they can't detect with their ordinary senses, and this in turn creates fear and uncertainty on the part of individuals who might be exposed in industry. For this reason, it was stated, occupational exposure to radiation should be placed in proper perspective and treated in an objective manner.

Witnesses emphasized that the effect of ionizing radiation on an individual depends upon the length of time during which the dose is received, the part or parts of the body actually exposed, and the nature and activity of the radiation source. For example, a relatively large dose spread over many years does not have the same effect upon a person as the same dose given in a short period of time, such as a few seconds or a few hours. Likewise, a large dose received on a limited area of the body such as the skin of the hand does not have the same effect upon a person as if the whole body were exposed to the same quantity of ionizing radiation.

The difference between genetic effects (affecting future generations) and somatic (nongenetic) effects of radiation on human beings was discussed in some detail. It was pointed out that somatic effects applied to the physical body of the individual and the potential injury to that person's body, while genetic effects referred to possible damage to the reproductive cells of the individual which might not actually be seen until future generations were born.

Witnesses also discussed the question of a "threshold" level of radiation exposure below which no biological injuries are supposed to occur. It was noted that while recent evidence may indicate the possibility of such a threshold existing for low level exposures there is need for more study and research before any definitive answer can be given to this question.

There was agreement by the witnesses that it would be difficult to tell whether a given short-term exposure to ionizing radiation could later cause leukemia or other forms of cancer, or whether these diseases would have occurred without such exposure. In other words, it would at the present time be difficult, if not impossible, to determine the causal relationship between the exposure and a subsequent disability many years later. This is one of the most difficult problems involved in injuries resulting from ionizing radiation and in compensating workers for such injuries.

Testimony was given that miners in the uranium mines are exposed to relatively high levels of radon gas and associated radioactive products. These find their way into the lungs of the miners through inhalation. At the present time a study is being undertaken by the U.S. Public Health Service on 3,200 miners who have previously worked in or are presently working in uranium mines. The study includes complete medical examinations of these men at 3-year intervals, and every time that one of them dies, an effort is made to

[4] Most of the factual information on this subject was contained in the Joint Committee print "Selected Materials on Employee Radiation Hazards and Workmen's Compensation," which was distributed prior to the hearings.

determine the cause of death. Since the study has been under way for only a few years, it was readily admitted that there was not enough data yet available on which to base any definitive conclusions.

The opinion was expressed that so-called "safe" exposure limits could only be developed over a period of time as the result of sufficient experience with individual exposure and concurrent technical research. Application of judgment to the combination of these two kinds of scientific data was advocated as the best means for a solution of the problem.

Other witnesses, representing labor, expressed the view that an individual worker does not have sufficient knowledge of the nature of radiation, how it injures people, and what can be done about it. The example cited indicated quite clearly that the lack of knowledge on the part of workers undoubtedly creates fears and uncertainty. It was felt that much of this difficulty could be removed if individual workers knew more about what radiation measurements mean in terms of possible injury and if they knew more about the nature of the injury which could be caused by excessive exposure to ionizing radiation. A similar comment was made in connection with supervisors who might not be able to understand the subject sufficiently well to explain it to the individual worker or to supervise him adequately at his work.

2. Standards of radiation protection

It was brought out at the hearings that as long ago as 1928 a voluntary organization was established within the United States which concerned itself with the establishment of human exposure limits to ionizing radiation, initially applied to X-rays and radium since these were the only sources of radiation utilized at that time. This was the origin of the National Committee on Radiation Protection (NCRP).[5] In the interim years the committee gradually developed into a substantial sized organization. At the present time it has a main committee consisting of some 40 people as well as many subcommittees composed of technical people with widely varied backgrounds who are concerned with radiation and its various applications. There was some discussion, however, as to whether the present makeup of the NCRP is broad enough to include adequate representation from all major areas of competence.

In contrast to its early days, the committee now makes recommendations on exposure limitations for many different kinds of ionizing radiation, chiefly occupational in nature. These recommendations cover internal and external exposure and include both somatic and genetic effects.

For example, prior to 1934 the NCRP recommended a maximum exposure of 100 rem [6] per year of external whole body radiation for occupational purposes. In 1934 additional studies were made resulting in new recommendations which established a maximum of 30 rem per year. In 1948 these were again reexamined and from that time until 1956, the recommendations made by the NCRP reduced the exposure limit to 15 rem per year. In 1958 another reduction was made to an *average* of 5 rem per year, subject to a maximum of 12 rem in any one year.

[5] A detailed history of the National Committee on Radiation Protection and its relationship to the ICRP is contained in the original committee print, "Selected Materials on Employee Radiation Hazards and Workmen's Compensation."

[6] REM: that quantity of any type ionizing radiation which when absorbed by man produces an effect equivalent to the absorption by man of 1 roentgen of X or gamma radiation. For detailed discussion of biological effects, see National Academy of Science Report (1956) on "The Biological Effects of Atomic Radiation."

The reasons given for the repeated reduction over the years in the limits recommended for occupational exposure of individuals were: (1) With the development of more penetrating radiation over the years which can reach internal blood forming organs, more care had to be used since these organs are more sensitive to radiation than is skin. (2) Technical advances in science have made it possible economically to provide a greater degree of safety. (3) Information has been developed which indicates the potentially harmful genetic effects of radiation when the whole body is exposed. There is a need, therefore, to reduce such exposures to a minimum in order to avoid adverse genetic effects on future generations. (4) A basically more conservative attitude has developed among NCRP members themselves who feel that because an increasing number of people are being exposed to radiation, it would be wise to reduce the exposure limit to the lowest possible level for the benefit of the whole population.

It was specifically mentioned that to the knowledge of all the witnesses, no one who has been exposed to levels considered permissible by the NCRP, has shown any evidence of injury from radiation. On the other hand, the possibility that some injury might in fact have occurred, but was not discernible by present scientific and medical methods, cannot be ruled out.

It was brought out during the testimony that there are no well-established exposure limits applying to radon gas encountered in underground uranium mines. However, the U.S. Public Health Service did develop a "suggested working level" of radon concentrations for uranium mines which was established as a result of experimentation with animals and relating this experience to the recommendations of the NCRP on X-ray exposure. A need for more definitive standards in the field was indicated.

Another problem area brought out in the testimony is the varying standards used by industry for the surface contamination of clothing and other articles that employees wear home. It was pointed out, for example, that one plant permitted employees to go home with contaminations which would measure up to 4,000 counts per minute, whereas another plant doing a similar operation would not permit them to go home unless the counts were reduced to 500 counts per minute.

Many witnesses stressed the importance of uniform standards of radiation protection throughout the Nation so as to avoid confusion caused by a multiplicity of individual standards which vary widely. A number of witnesses indicated that the setting of such uniform standards should be vested in one agency of government at the Federal level so that standards of safety with regard to radiation protection would be the same throughout the United States.

The discussion of this subject indicated a need for creating a mechanism to provide standards which can be uniformally used throughout the country. A need was also indicated for coordination of the standards-making procedure, and the suggestion was made that this might be accomplished through some mechanism such as a board or committee composed of representatives from the various agencies directly concerned.[7] Among the major problems facing such a group would be development of better guidance on what constitutes a "safe" exposure level under various conditions.

[7] See footnote 3, p. 5.

One witness referred to the "philosophy of risk" that is incorporated in the creation of standards by the NCRP and expressed the view that this was unacceptable. Representatives of the NCRP indicated that there is some reason to believe that any exposure to radiation does some damage to the individual, no matter how small this damage might be or whether it could in fact be measured. On the other hand, they pointed out, if radiation is to be used for the benefit of mankind, some risk has to be accepted as part of the benefits to be realized from the use of radiation. The constant lowering of the maximum permissible levels for occupational exposure was the subject of considerable discussion, as was the question of what constitutes a "safe" exposure level. The question was also raised as to what assurance there is that present levels would not be reduced again sometime in the future.

It was pointed out, in this connection, that even though every known precaution is taken, there is some element of risk in all industrial development and it is recognized that no activity is 100 percent "safe" in an absolute sense. In many cases, what was considered to be "safe" 25 years ago would not be accepted as "safe" today because knowledge and experience gained in the interim make it possible to provide better methods for protection of workers against injury. It would appear, therefore, that in establishing standards for occupational exposure to radiation some such concept will have to be adopted, keeping in mind the need for maximum protection of people. Essentially, a balance must be struck between standards based on the best available information—and this will always be a matter of expert judgment—and the need to get on with the job of utilizing atomic radiation for man's benefit.

In this connection, there was some criticism of the lack of adequate information upon which to base present standards. At the same time, other witnesses pointed out that considerable research is currently being performed for the express purpose of developing information in this area. It was noted that the AEC Division of Biology and Medicine is currently spending $18 million a year on such research and that the Public Health Service is also contributing to this effort.

(See footnote on p. 5 regarding plans for the Department of Health, Education, and Welfare to intensify its efforts in the field of radiological health and environmental radiation hazards.)

3. Control of radiation hazards

It was pointed out by several witnesses that the methods necessary to control radiation hazards in industry are basically similar to those which have been used successfully in the past in the control of other types of occupational hazards. Examples cited were the control of gases, dust and toxic materials in industry.

The point was made several times that at the present time, some 90 to 95 percent of the radiation hazards in the United States are from sources which are not under the control of the Atomic Energy Commission. These include X-ray equipment, particle accelerators, and naturally occurring sources of radiation such as radium and polonium. Another point that was stressed was that the use of radiation in industry in itself is not new and that it has been used since World War I. What has changed is that the energy of the various sources of radiation have gradually increased over the years, requiring some modifications in the methods of control needed to provide adequate protection against the higher energy levels used.

Several witnesses indicated the different degrees of hazard with different types of installations. For example, high-powered test reactors, it was agreed, had a greater potential hazard to employees than other types of reactors or radiation sources. This hazard was created by the necessity of continually inserting and removing samples from the reactor, together with other testing requirements. In contrast, the power reactors designed to operate continuously at a given level do not in general expose employees to as great an operating hazard, except when changes in the core or repairs in the nuclear system become necessary.

In large AEC contractor installations, carefully documented control programs are established in which methods of radiation protection include regular inspection of the facilities, monitoring of both the employees and the environment in which they work, close supervision of employees, medical examinations and medical evaluation of monitoring procedures, and intensive training of both employee supervisors and safety personnel. Where these measures are followed, the hazards are in general adequately controlled.

Evidence was presented that the actual exposure ranges from a low of about 10 percent of maximum permissible levels to employees in these installations to as high as 50 percent of these levels. The number of safety personnel engaged in evaluating exposures and making sure that hazards are adequately controlled, range from as many as one trained safety technician for every six workers to as few as two per thousand workers.

On the other hand, in smaller operations where isotopes are used in commercial applications, there is evidence to indicate that because of economic considerations, there is a tendency to come closer to, and in some instances possibly exceed the limit of an average of 5 rem per year by utilizing the reserve exposure that the individuals might have. Here the number of persons involved in directly supervising control methods is far less than in larger installations.

Testimony was presented by witnesses and materials were submitted to show that the radon gases which are created in uranium mining operations can be adequately controlled by proper ventilation in the area where the miners work. The U.S. Public Health Service has published a bulletin describing the methods which have proved to be successful and the kinds of ventilation necessary in order to reduce the concentration of radon gas in the air to a "safe" level.[8]

There was no evidence available to indicate how successful radiation protection measures have been in the past in controlling exposure from non-AEC sources, which as of the present time comprise the greatest portion of exposure throughout industry. No data were available on the number of injuries from these non-AEC sources of radiation so that no comparisons could be drawn.

There was evidence submitted by at least two labor unions, the Boilermakers and the Plumbers and Pipefitters, to indicate that they recognized the need for greater education and training among their members on the nature and control of radiation hazards. Both have inaugurated training programs for their members to meet these needs. All of the testimony submitted to the committee indicated the need for training, not only of supervisory personnel but employees as well. The testimony also stressed the need for health

[8] See U.S. Public Health Service Bulletin 494 "Control of Radon and Daughters".

physicists and safety personnel who are responsible for supervising control methods.

(*a*) *Existing Government controls.*—Testimony presented to the committee indicated that there are presently a variety of governmental agencies involved in varying degrees in controlling radiation hazards.[9]

It was pointed out, in this regard, that there is always a danger of excessive regulation and that this needs to be watched constantly in order to avoid conflict or duplication of effort. On the other hand, there was clear evidence that at least in one instance—uranium mining—there is an apparent lack of regulation and enforcement in a situation where they are needed. (See p. 9.)

The testimony described in some detail the AEC's licensing and regulatory program. Essentially, this deals with the materials which are under the control of the AEC. Anyone who wishes to use these materials must secure a license, and in order to do this must satisfy certain requirements with regard to personnel, their training, financial status, the use to which it is proposed to put the materials, and how it is proposed to dispose of them after they have been used. The amount of control is in direct proportion to the quantity or the activity of the material in question and to the degree of the hazard that it presents. AEC regulations specify in some detail the amount of exposure which employees may be permitted to have, and since the hearings, the AEC has proposed changing these regulations to reflect the latest recommendations of the National Committee on Radiation Protection made 2 years ago. (See p. 7.)

Enforcement of these regulations involves inspection of the premises and an evaluation of whether the licensee is following the prescribed procedures. If minor violations are found, these are called to the attention of the licensee, which in most instances he corrects immediately. If, however, the hazards discovered are of a more serious nature, the licensee can be ordered to suspend operations immediately and a hearing scheduled to determine whether the suspension order should be continued or not. Likewise, provision is made for a restricted type of operation if this is deemed to be necessary. The AEC regulations require reporting of overexposures to personnel and loss of sources.[10]

AEC contractors are supervised, regulated, and controlled in somewhat different fashion since they fall under the Walsh-Healey Public Contract Acts [11] and also because under the contract provisions, the AEC has direct control over their procedures and their methods of operation. In these cases a simple directive to the contractor results in the necessary changes being made, with the cost of the changes being borne by AEC.

Several witnesses raised the basic question as to whether or not it was sound to have one agency, namely the AEC, engaged on the one hand in promoting the greater use of atomic energy and on the other, fixing responsibility within the same agency for control and regulation of these users. Representatives of the AEC explained that they were aware of this problem and in consequence when the regulatory and licensing activities, as well as the inspection activities, were set up within the Commission, they were created as separate divisions report-

[9] See committee print for more detailed information on this subject.
[10] See committee print, p. 250.
[11] See p. 4.

ing directly to the General Manager and having no direct responsibility to any other divisions which might be engaged in promoting the use of atomic energy materials or the development of their use.

Several witnesses described the programs that are in existence in the various States with regard to regulation and control.[12] A number of States have regulatory codes dealing with radiation, some of which cause problems of compatibility among the various agencies within the State. In the State of New York there are two codes, one in the health department, and one in the labor department. These codes are applied to different kinds of activities, the health department assuming responsibility for universities, hospitals, medical uses, etc., and the labor department's code applying to industrial uses of radioactive materials or equipment. A representative from the State of Pennsylvania indicated that there was a code promulgated by the State health department that the labor department of the State could not enforce. On the other hand, the labor department could require changes if the department found radiation hazards in any particular operation. The consens of those who discussed this particular aspect of governmental control was that there was a very definite need to have more persons at the State level adequately trained in this science in order that regulations that had been adopted or promulgated in the various States may be entered properly and intelligently.

(*b*) *Training and education.*—On the subject of training and education, the AEC described in some detail its training program, both for its own personnel and for its contractors. A description was given of the fellowship program for personnel going to work in industry or for the States, together with the recently inaugurated program of assistance in the training of community groups in the handling of radioisotopes and other radioactive materials. The AEC also collaborates with the U.S. Public Health Service in their training programs and requested a study by the Stanford Research Institute to review the needs of vocational training on the subject of radiation.

Other agencies of the Federal Government, such as the Office of Civilian Defense, the Department of Commerce, the Defense Department, the Department of Health, Education, and Welfare, and the U.S. Department of Labor, all indicated that they were performing various training functions at the present time and were engaged in expanding these as rapidly as possible. Examples of these training and educational programs are the special training courses of the U.S. Public Health Service for persons in either basic or advanced courses in radiation; and the U.S. Department of Labor, both in its safety standards bureau and in connection with the training of State safety personnel in the fundamentals of radiation. The Labor Department's Bureau of Apprenticeship and Training also sponsors vocational training and apprenticeship courses which include the fundamentals of radiation and its hazards.

A representative from the State of Pennsylvania indicated that the State had embarked upon a program of training both employed workers and key personnel in local communities in the fundamental of radiation, its hazards and means of control, so that these people in turn could train others in their communities.

It could be concluded from the evidence submitted at the hearings that there are many areas in which there are no regulations or enforce-

[12] See committee print, pp. 141–171.

ment procedures available to control other than AEC sources of radiation. It could also be concluded that although much training is in process, there is a great need for such efforts to be accelerated and expanded. Such action is needed to provide wider dissemination of information on radiation control to workers, foremen, and community employees such as firemen and policemen. This is particularly important that in the event of accidents or disasters, these persons would be apprised of the potential hazards and would be sufficiently well trained to know how to protect themselves and the public in the immediate area.

Throughout the testimony there was a consistent agreement on the need of a centralized depository for exposure records of individuals who work in radiation industries. This was referred to as a control that is necessary to make sure that no one is unnecessarily overexposed by moving from one job to another or from one State to another. Central exposure records also serve as a valuable educational tool in that they enable the individual to be aware at all times of what his exposures have been.

B. COMPENSATION FOR RADIATION INJURIES

1. Existing laws and needs

There are some 54 jurisdictions whose laws determine the amount of compensation benefits to workers who are injured and/or disabled as a result of their work, and under what circumstances these benefits are to be paid. The 54 jurisdictions are the 50 States, Puerto Rico, and District of Columbia, together with the Longshoremen's Act, and the Federal Employees Compensation Act. Each law is different from the others, either slightly or to a marked degree. In some cases the laws have been interpreted by court action so that they have been made to apply either more liberally or less so than when they were originally enacted.

The laws differ in many substantial ways. A few of such differences are (*a*) coverage of all occupational diseases versus only a specific listing or schedule; (*b*) the amount of weekly benefits; (*c*) the amount or duration of medical benefits; (*d*) the time limit for filing claims; (*e*) coverage for radiation diseases; (*f*) voluntary versus compulsory coverage; and many others. An analysis of the various laws and their differences is contained in appendix A and also in the committee print.

A number of witnesses expressed the view that the States are handling the problem of compensation for radiation injury very well and have in general amended their laws to insure coverage fo all workers who are injured, disabled, or killed as a result of radiation diseases.

Other witnesses felt that because of the wide variation which exists between the various jurisdictions, there is a definite need for a more uniform type of compensation law. For example, such a uniform law would insure that employees who might work in one State could move to another State and receive the same kind of treatment and benefits for injuries that they received in the original State.

Certain basic questions were raised during the course of the testimony concerning the operation of existing workmen's compensation systems. These were questions such as:

1. "Can the 54 different jurisdictions be persuaded to change their laws so that workers in one State will have similar or com-

parable coverage as workers in other States for the same injury?"

2. "Could present laws be amended and administered to take care of the late effects of radiation injuries which might not be discernible or detectable for a number of years after the actual exposure?"

3. "Why is it necessary to distinguish between occupational and nonoccupational injuries? The attempt to do this increases the costs of administration and often results in arbitrary decisions, with corsequent injustices to some individuals."

Another question that was raised is the problem of multiple exposures under several employers. This is the case where a worker might be exposed to radiation on repeated occasions while working for successive employers and not actually be disabled until some time later. The question then is: "Which employer should bear the cost of such disability and how should this be handled?"

There were some who recommended that the last employer be held liable in order to make for more efficient administration, but there were other witnesses who felt that liability should be apportioned among the several employers, with shares proportional to the amount of radiation exposure received by the individual under each employer.

The AEC testified that contractors working for them are, in many cases, required to take out private insurance to supplement the compensation laws in the States in which they happen to operate so that all contractor employees who might be injured will receive similar treatment, without regard to the location of the installation. Other problems arise in connection with the maintenance of medical records of workers who have been exposed. Again, it was suggested that these records be kept in a central location for efficiency of administration and to permit easier handling of problems associated with radiation diseases.

In summary, some witnesses felt that the States would take action if they were given the proper information and guidance as to what action should be taken and the reasons for it. Others felt that this was not a real solution to the problem. They contended that the States might take a long time enacting appropriate legislation and that there would always be some States that did not recognize the hazard. In consequence there would be injustices to employees who might be injured in those States.

Several witnesses pointed to the problem of establishing a casual relationship between the original exposure and the disability or symptoms of disability which might not occur until many years later. How, they asked, are various jurisdictions going to contend with the problem, particularly the adjudication of claims? Other witnesses indicated that this situation is not dissimilar from the problems associated with heart cases, silicosis, and similar diseases which are at least similar in the respect that symptoms may not occur until a long time after the original injury or exposure.

2. Proposed changes in laws

A number of suggestions were made by witnesses as to changes which might be desirable to make in existing workmen's compensation laws in order to provide more adequate and uniform coverage. Basically, these could be listed as follows: (*a*) That the laws all be compulsory and elective provisions be removed; (*b*) that the law

cover all employers, regardless of the number of persons actually employed; (*c*) that the law prohibit waivers for prior disabilities; (*d*) that provision be made for a subsequent injury fund to take care of those workers who may have a prior disability; such fund to be broad enough to cover a disability other than the loss of a limb; (*e*) that there be full occupational disease coverage incorporated in the law; (*f*) that the time limit for filing claims after which the statute of limitation starts be made flexible to take into consideration such items as delayed symptoms, as produced for example, by radiation injuries; (*g*) that full coverage for medical benefits be provided; (*h*) that the law provide for the compensation agency to supervise the medical care given to injured workers; (*i*) that benefits be provided during rehabilitation of injured workers.

Other proposals included the recommendation that existing State laws be amended to give the same treatment to radiation diseases as are currently given to other occupational diseases so that there will be no difference in the handling of claims for one type of disease against another. Establishment of a time limit for filing claims was proposed by practically everyone who made recommendations, together with provision of complete medical treatment during disability. Recommendation was also made that present laws be amended to provide that the last employer of any worker who has received significant exposure is the one who should be held responsible for the entire cost of any resulting disability. A number of witnesses expressed the view that compensation should be based upon the loss of wages due to the injury or loss of earning capacity as a result of any injury or disability.

Other witnesses went further and recommended that the States adopt a complete system of enforcible regulations, taking their lead from regulations recommended by the Federal Government. There were one or two who proposed establishment of an injury fund to pool losses from radiation exposure, either on a State or national basis, so that there would be adequate payments over the necessarily long periods of time which might be involved.

Several witnesses recommended that the Federal Government enact a national system of workmen's compensation laws so that there would be uniformity in the type of benefits paid and in the basis upon which claims are adjudicated. These recommendations included provisions for uniform standards of safety and exposure throughout the United States; the same care for injured employees, regardless of the State in which the individual happens to work; and the maintenance of central records of radiation exposure as part of the Federal compensation administrative organization. It was proposed that the administration of such a program should be under the U.S. Department of Labor, that the benefits should be paid on the basis of wage losses due to overexposure as well as actual disability, and that all radiation injuries be included under this law, regardless of the kind of radiation source from which the injury was sustained.

Other witnesses recommended that a system of radiation control be enacted and that responsibility be vested in the U.S. Public Health Service; that a system of Federal codes and regulations also be adopted which would be enforcible by representatives of the Federal Government.

All of those who recommended that the Federal Government assume responsibility for the administration of a Federal law to

compensate for radiation injuries cited the fact that the States are slow to act, that their legislatures normally only meet every 2 years, and that in many cases a reactor accident that might occur could affect people in more than one State. Therefore, they contended, this was more of a Federal problem than it was a State problem and that furthermore, the States in many instances are not staffed with personnel who were adequately trained in this specialized field.

In contrast to this view, other witnesses maintained that there is no real urgency for the Federal Government to take action at this time. They reasoned that the exposures which might have taken place in the past several years have not been long enough ago to produce any real delayed symptoms; that it will be a number of years yet before such delayed symptoms are evident and before the problem will be presented for decision by the various compensation jurisdictions. In the meantime, they argued, the States can and probably will amend their laws to provide the necessary coverage.

It was also pointed out that information concerning the radiation and nuclear energy hazards has only become generally available to the public during the past several years and that as a result there has not been sufficient time for the various States and their agencies to become aware of the need for amending their laws. This was offered as a reason why many of the States had not taken such action. Others pointed out that in some instances there was not an adequate realization on the part of State legislatures of the growth of atomic industry and of the increasingly large number of isotope and other radiation applications being utilized by industry in the States.

The need for further intensive study of this complex matter is clearly indicated. It is hoped that this summary-analysis, together with hearings and committee print published prior to the hearings, will serve as a useful guide to further action, both at the State and Federal level.

APPENDIXES

APPENDIX A

JOINT COMMITTEE ON ATOMIC ENERGY

Subcommittee on Research and Development

OUTLINE OF PUBLIC HEARINGS ON EMPLOYEE RADIATION HAZARDS AND WORKMEN'S COMPENSATION

TUESDAY, MARCH 10 (P.M.)

I. General background

Background statement outlining the broad problem of industrial radiation hazards as a general framework for subsequent detailed discussion of radiation hazards to employees in atomic energy installations, including:

A. Opening statement: Representative Price.

B. Standards and their historical development: Dr. Lauriston S. Taylor, Chief, Atomic and Radiation Division, National Bureau of Standards.

C. Dr. Russell Morgan, Johns Hopkins University, consultant, U.S. Public Health Service, National Advisory Committee on Radiation.

D. Origin and nature of industrial hazards and radiation injuries: Dr. Shields Warren, Cancer Research Institute, New England Deaconess Hospital.

1. Source of injury.
2. Kinds of injury.
3. General scope and extent of radiation hazards and accidents.

E. Safety programs:

1. General description of programs to promote industrial safety at Government, contractor, and licensee installations: Dr. Charles R. Williams, Liberty Mutual Insurance Co.

WEDNESDAY, MARCH 11 (A.M.)

II. Examples of experience at individual installations

Typical examples of operational experience with radiation problems encountered in individual installations. Primary, but not exclusive, focus would be on atomic radiation injury. Discussion would cover measures employed locally at individual installations, Government, contractor, and licensee, to maximize worker safety, including physical and personnel protective measures, instrumentation and monitoring, education and training, and local inspection.

A. Opening statement: Representative Price.

B. Survey of experience with radiation hazards in atomic energy installations: Dr. Richard L. Doan, manager, Phillips Petroleum Co., National Reactor Testing Station, Arco, Idaho.

C. Experience at various AEC and private installations:

1. Mines and mills: Mr. Duncan H. Holaday, Public Health Service, Salt Lake City, Utah.
2. AEC installations:
   Dr. Hugh F. Henry, superintendent, safety, fire and radiation control, Union Carbide Nuclear Co., Oak Ridge, Tenn.
   John Bates, Oil, Chemical and Atomic Workers, AFL–CIO, Oak Ridge.
3. Industrial uses of isotopes:
   Dr. F. C. Henriques, Technical Operations, Inc., Burlington, Mass. (brief survey).
   James Black, Esso Research & Engineering Co., Linden, N.J.

THURSDAY, MARCH 12

III. Current Federal, State and private activities with regard to prevention of radiation accidents to employees

Discussion of measures being employed by the Federal Government, States, and private organizations to minimize radiation hazards and protect the health and safety of employees, including:

A. AEC and other Federal agencies:
1. Regulatory activities: Harold L. Price, Director, Licensing and Regulation Division, AEC.
2. Educational and promotional activities; description of the role of AEC, Public Health Service, and Labor Department:
Presentations: Oscar S. Smith, Director, Office of Industrial Relations.
Comments:
James G. Terrill, Jr., Chief, Division of Radiological Health, Public Health Service.

B. State activities:
1. Dr. Morris Kleinfeld, director, Division of Industrial Hygiene, New York State Department of Labor.
2. John O'Neill, Department of Labor and Industry, State of Pennsylvania.

C. Private activities:
1. Employer programs: C. M. Patterson, superintendent, health physics, E. I. du Pont Co., Savannah River plant.
2. Union programs:
Fred McGowan, International Brotherhood of Boilermakers, AFL–CIO.
Joseph Phillips, United Association of Plumbers and Pipefitters, AFL–CIO.
William Griffin, Bureau of Labor Standards, Department of Labor.

TUESDAY, MARCH 17 (A.M. AND P.M.)

IV. Application of workmen's compensation laws to radiation injuries

Introduction: Dr. Earl Cheit, Institute of Industrial Relations, University of California, Berkeley.

A. Main problem areas:
1. Coverage of radiation diseases.
2. Medical benefits and supervision of medical care.
3. Statute of limitations.
4. Proof of causal relationship.
Presentations:
Dr. Irving Tabershaw, consultant, New York Department of Labor.
Harry Nelson, former director, Wisconsin Department of Workmen's Compensation.
Ashley St. Clair, counsel, Liberty Mutual Insurance Co.

B. Existing laws and practices:
1. Existing laws and regulations, and their inadequacies: Dr. Earl Cheit.
2. Present methods of meeting inadequacies:
(*a*) AEC experience (chiefly contract operations): Oscar S. Smith, AEC.
(*b*) Private insurance: J. Dewey Dorsett, general manager, Nuclear Energy Liability Insurance Association.
(*c*) State compensation insurance funds: Ray Oakley,[1] secretary-treasurer, American Association of State Compensation Insurance Funds.
3. Seminar discussion: To include definition of overall objectives of workmen's compensation and whether they are being met.
Participants:
Dr. Earl Cheit, University of California.
Forrest Western, AEC.
Harry Nelson, former director, Wisconsin Department of Workmen's Compensation.
Ashley St. Clair, counsel, Liberty Mutual Insurance Co.
Clint Fair, AFL–CIO.

[1] Could not attend because of illness.

WEDNESDAY, MARCH 18 (A.M. AND P.M.)

V. Proposed changes in laws

A. Résumé of inadequacies and proposed changes: Dr. Herman Somers, Haverford College, Pa.

B. Proposals for change:

1. State action (a.m.):
   (*a*) Council of State Governments, Norman Erbe, chairman, National Association of Attorneys General.
   (*b*) International Association of Industrial Accident Boards and Commissions (IAIABC), Ned Parsekian, chairman.
   (*c*) Department of Labor recommendations: Arthur Motley, Chief, Bureau of Labor Standards.
   (*d*) Employer and insurance organizations.
2. Federal action (p.m.):
   (*a*) Andrew Biemiller, legislative representative, AFL–CIO.
   (*b*) Elwood Swisher, vice president, Oil, Chemical & Atomic Workers, AFL–CIO.
   (*c*) James Brownlow, president, Metal Trades Departmet, AFL–CIO.

THURSDAY, MARCH 19 (A.M. AND P.M.)

VI. Summary

Leo Goodman, consultant, United Auto Workers, AFL–CIO.
Harold Price, Director, Division of Licensing and Regulation, AEC.
Leonard English, Firefighters International.
Otto F. Christenson, Council of State Manufacturers Associations.
Hubert Yount, insurance associations.
Dr. W. A. McAdams, General Electric Co.

Roundtable discussion of important points emerging from the hearings.

Participants:
Dr. Earl Cheit, University of California.
Andrew Biemiller, AFL–CIO.
Norman Erbe, National Association of Attorneys General.
Dr. Russell Morgan, Public Health Service.
Herschel Plaine, AEC.
Ashley St. Clair, counsel, Liberty Mutual Insurance Co.
Ned Parsekian, IAIABC.
Arthur Motley, Department of Labor.
Otto F. Christenson or Dr. W. A. McAdams.

Following roundtable discussion:
Development and Use of Standards of Radiation Protection, Dr. Charles L. Dunham, Director, Division of Biology and Medicine, AEC.

Appendix B.—Extent of Protection Under State Workmen's Compensation Laws for Workers Exposed to Radiation Hazards*

	Compulsory Law (A)	No Numerical Exemption (B)	Reciprocal Arrangements for Extraterritorial Coverage (C)	Waivers Prohibited (D)	Full Coverage of Occupational Diseases (E)	Time Limit for Filing Claim in Occupational Disease cases based on date of worker's knowledge and date of disablement (F)	Unlimited Medical Benefits (G)	Authority for Workmen's Compensation Agency to Supervise Medical Care 1/ (H)	Broad Type Coverage Under Second or Subsequent Injury Fund (I)	Maintenance Benefits During Rehabilitation (J)	Administration by State Labor Department or Workmen's Compensation Agency (K)	Cash Benefits Equal to at Least Two-Thirds of State's Weekly Wage 2/ (L)	Benefits for Permanent Total Disability Payable for Life or Period of Disability (M)	Benefits for Death Payable to widow Until Death or Remarriage (N)
Ala.	—	—	—	(3)	—	—	—	—	—	—	—	—	—	—
Alaska	X	X	—	X	X	—	—	—	X	X	X	X	—	—
Ariz.	X 4/	—	—	X	(5)	—	—	X	—	X	X	X	X	X
Ark.	X	(6)	—	—	X	—	—	X	—	X	X	—	—	—
Calif.	X	X	X	X	X	X	X	—	X	—	X	—	X	—
Colo.	—	—	(7)	—	(8)	—	—	X	—	—	X	—	X	—
Conn.	—	—	—	—	X	—	X	X	—	—	X	—	X	X
Del.	X	—	—	X	X	—	X	X	X	—	X	—	X	—
D. C.	X	X	—	X	X	—	X	—	X	X	X	X	X	X
Fla.	—	—	—	X	X	—	(9)	X	X	—	X	—	X	—
Ga.	—	—	—	—	(8)	—	—	X	—	—	X	—	—	—
Hawaii	X	X	—	X	X	—	X	X	X	X	X	X	X	(10)
Idaho	X	X	—	—	(8)	—	X	X	—	—	X	—	X	—
Ill.	X	X	—	(11)	X	—	—	X	—	—	X	—	X	—
Ind.	(12)	X	—	—	X	—	(9)	X	—	—	X	—	—	—
Iowa	(12)	X	—	—	—	—	—	—	—	—	X	—	—	—
Kans.	—	(13)	—	—	(8)	—	—	X	—	—	X	—	—	—
Ky.	—	—	—	X	X	—	—	X	—	—	X	—	—	—
La.	—	X	—	X	(8)	—	—	—	—	—	—	—	—	—
Maine	—	—	—	(11)	—	—	—	—	—	—	X	—	—	—
Md.	X	X	—	—	X	—	(9)	—	—	—	X	—	—	—
Mass.	X	—	—	—	X	—	X	—	—	—	X	X	X	—
Mich.	X	—	—	X	X	—	(9)	—	—	—	X	—	X	—
Minn.	X	X	—	—	X	—	X	X	X	X	X	—	X	—
Miss.	X	—	X	X	—	—	—	—	—	X	X	—	—	—
Mo.	—	(14)	—	X	X	—	(9)	X	X	X	X	—	X	—
Mont.	(12)	X	—	X	—	—	—	X	—	—	X	—	—	—
Nebr.	—	X	—	X	X	—	X	X	—	—	X	—	X	—
Nev.	X	—	X	—	X	—	—	X	—	—	X	—	X	X
N. H.	X 4/	—	—	—	—	—	(9)	—	—	—	X	—	—	—
N. J.	—	X	—	X	X	—	(9)	—	X	—	X	—	X	—
N. Mex.	—	—	(7)	(3)	(8)	—	(9)	—	—	—	—	—	—	—
N. Y.	X	(15)	—	X	X	X	X	—	X	X	X	—	X	X
N. C.	—	—	—	—	(5)	—	(9)	X	—	—	X	—	—	—
N. Dak.	X	X	X	X	—	—	(9)	(16)	—	X	X	—	X	X
Ohio	X	—	—	—	X	—	(9)	—	—	—	X	—	—	—
Okla.	X	—	—	—	(8)	—	(9)	X	—	—	X	—	—	—
Oreg.	—	X	X	X	X	—	(9)	X	—	X	X	—	X	X
Pa.	—	X	—	X	X	—	(9)	X	—	—	X	—	X	—
P. R.	X	X	—	(3)	X	—	X	X	X	—	X	X	—	—
R. I.	X	—	X	X	X	—	(9)	—	—	—	X	—	X	—
S. C.	—	—	—	—	X	—	(9)	X	—	—	X	—	—	—
S. Dak.	—	X	X	—	(5)	—	—	—	—	—	—	—	—	—
Tenn.	—	—	—	—	—	—	—	—	—	—	X	—	—	—
Tex.	(17)	—	—	—	(8)	—	—	X	—	—	X	—	—	—
Utah	X	X	(7)	X	X	—	—	X	—	X	X	—	X	—
Vt.	—	—	—	—	(8)	—	—	—	—	—	X	—	—	—
Va.	X	—	—	—	—	—	—	X	—	—	X	—	—	—
Wash.	X	X	—	X	X	—	X	X	X	—	X	—	X	X
W. Va.	—	X	—	X	X	—	—	—	X	X	X	—	X	X
Wisc.	X	—	—	—	X	—	X	X	X	X	X	—	X	—
Wyo.	X	X	(7)	X	—	—	—	—	—	—	—	—	—	—

X Law Meets the Recommended Standard.

— Law Does Not Meet Standard.

* This chart is limited to provisions in the laws and does not include information on judicial decisions or administrative interpretations, rules and regulations.

Prepared by U.S. Department of Labor, Bureau of Labor Standards, December 1958.

FOOTNOTES TO CHART

1/ Based on whether workmen's compensation agency has authority to order change in treating physician.

2/ Average wages based on wage of workers covered under unemployment insurance laws for 1957.

3/ No provision in the law, waivers not permitted in practice, according to the State workmen's compensation agency.

4/ Employee may reject coverage under the Act.

5/ Scheduled coverage -- very limited for radiation diseases.

6/ Contractor engaged in building or building repair work is covered if he employs two or more employees at any one time. If contractor subcontracts any portion of work, contractor is covered if either the contractor or subcontractor has only one employee.

7/ Not specifically provided in law but authorizes workmen's compensation agency to make such arrangements with other States.

8/ Scheduled coverage including radiation diseases.

9/ Law limits period or amount but authorizes administrative agency to extend without limit.

10/ Benefits for death payable until death or remarriage to a widow who is physically or mentally incapable of self support.

11/ Waivers can be granted but according to the workmen's compensation agency, waivers have not at any time been permitted.

12/ Compulsory only as to coal mining.

13/ Numerical exemption does not apply to employment in mines and building construction.

14/ If Workmen's Compensation Commission determines that employer of 10 or less employees is engaged in hazardous employment, such employer shall be covered unless he rejects coverage under the Act within 10 days.

15/ Numerical exemption applies only in cases of nonhazardous employments. However, the 14 groups of hazardous industries are so comprehensive that the numerical exemption seldom applies.

16/ Employee has initial free choice of doctor but Industrial Commission may order change by giving employee right to choose from a panel of at least three doctors chosen by Industrial Commission.

17/ Compulsory as to motor bus companies.

○